

IN THE CLAIMS:

Please amend the claims as follows:

1-25. (Cancelled)

26. (Currently Amended) A method for depositing a silicon carbide layer on a substrate, comprising:

introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber containing the substrate therein, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater, wherein the dopant compound is selected from the group consisting of an oxygen-containing compound, a silazane compound, a boron-containing compound, a phosphorus-containing compound, and combinations thereof; and

reacting the organosilicon compound by a plasma enhanced chemical vapor deposition process to form the silicon carbide layer having a dielectric constant less than 4.

27. (Currently Amended) The method of claim 26, wherein the dopant compound is selected from the group consisting of phosphine (PH_3), borane (BH_3), diborane (B_2H_6), ~~silazane compounds,~~ trimethylsilane, oxygen (O_2), ozone (O_3), carbon monoxide (CO), carbon dioxide (CO_2), and combinations thereof.

28. (Previously Presented) The method of claim 26, further comprising exposing the silicon carbide layer to a plasma treatment process.

29. (Cancelled)

30. (Currently Amended) The method of claim 26, wherein the ratio of dopant compound ~~is selected from the group consisting of an oxygen-containing compound, a nitrogen-containing compound, a boron-containing compound, a phosphorus-containing~~

~~compound, and combinations thereof~~ to organosilicon comprises between about 1:5 and about 1:100.

31-34. (Cancelled).

35. (Currently Amended) A method for processing a substrate having metal features formed therein, comprising:

depositing a barrier layer on the substrate on the metal features by introducing a processing gas comprising an organosilicon compound and a dopant compound into a processing chamber containing the substrate therein and generating a plasma of the processing gas, wherein the organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of about 6:1 or greater and the barrier layer has a dielectric constant less than 5 and the dopant compound is selected from the group consisting of an oxygen-containing compound, a silazane compound, a boron-containing compound, a phosphorus-containing compound, and combinations thereof; and

depositing a first dielectric layer adjacent the barrier layer, wherein the first dielectric layer comprises silicon, oxygen, and carbon and has a dielectric constant of about 3 or less.

36. (Previously Presented) The method of claim 35, further comprising depositing a silicon carbide etch stop on the first dielectric layer.

37. (Previously Presented) The method of claim 36, wherein the silicon carbide etch stop is depositing by reacting an organosilicon compound consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of about 6:1 or greater.

38. (Cancelled)

39. (Previously Presented) The method of claim 35, further comprising exposing the deposited barrier layer to a plasma treatment process.

40. (Cancelled)

41. (Currently Amended) The method of claim 35, ~~wherein the dopant compound is selected from the group consisting of an oxygen-containing compound, a nitrogen-containing compound, a boron-containing compound, a phosphorus-containing compound, and combinations thereof~~ wherein the dopant compound is selected from the group consisting of phosphine (PH₃), borane (BH₃), diborane (B₂H₆), trimethylsilane, oxygen (O₂), ozone (O₃), carbon monoxide (CO), carbon dioxide (CO₂), and combinations thereof.

42-45. (Cancelled)

46. (Previously Presented) A method for depositing a silicon carbide layer on a substrate, comprising:

introducing a processing gas comprising an organosilicon compound into a processing chamber containing the substrate therein, wherein the organosilicon compound has the formula SiH_a(CH₃)_b(C₆H₅)_c, wherein c is 2 and a+b+c=4; and

reacting the organosilicon compound to deposit the silicon carbide layer on the substrate.

47. (Previously Presented) The method of claim 46, wherein the processing gas further comprises a dopant selected from the group consisting of an oxygen-containing compound, a nitrogen-containing compound, a boron-containing compound, a phosphorus-containing compound, organosiloxane compounds, 1,3,5,7-tetramethylcyclotetrasiloxane (TMCTS), octamethylcyclotetrasiloxane (OMCTS), 1,1,3,3-tetramethyldisiloxane (TMDSO), phosphine (PH₃), borane (BH₃), diborane (B₂H₆), silazane compounds, trimethylsilane, oxygen (O₂), ozone (O₃), carbon monoxide (CO), carbon dioxide (CO₂), ammonia (NH₃), nitrogen (N₂), and combinations thereof.

48. (Previously Presented) The method of claim 46, wherein the organosilicon compound is selected from the group consisting of diphenylmethyilsilane ($\text{SiH}_1(\text{CH}_3)_1(\text{C}_6\text{H}_5)_2$), dipenyldimethylsilane ($\text{Si}(\text{CH}_3)_2(\text{C}_6\text{H}_5)_2$), diphenylsilane ($\text{SiH}_2(\text{C}_6\text{H}_5)_2$), and combinations thereof.

49. (Previously Presented) The method of claim 46, wherein the silicon carbide layer is deposited in a damascene structure as a material layer selected from the group consisting of a silicon carbide-containing barrier layer and a silicon carbide-containing etch stop layer.

50. (Previously Presented) The method of claim 46, wherein the silicon carbide layer has a dielectric constant of less than 4.

51. (Currently Amended) A method for depositing a silicon carbide layer on a substrate, comprising:

introducing a processing gas comprising an oxygen-containing compound, a dopant, and an organosilicon compound that consists essentially of silicon, carbon, and hydrogen, and has a carbon atom to silicon atom ratio of 6:1 or greater to deposit the silicon carbide layer on the substrate, ~~wherein the silicon carbide layer comprises less than about 15 atomic percent of oxygen, wherein the dopant compound is selected from the group consisting of a silazane compound, a boron-containing compound, a phosphorus-containing compound, and combinations thereof; and~~[[.]]

reacting the organosilicon compound by a plasma enhanced chemical vapor deposition process to deposit the silicon carbide layer on the substrate, wherein the silicon carbide layer comprises less than about 15 atomic percent of oxygen.

52. (Previously Presented) The method of claim 51, further comprising exposing the deposited silicon carbide layer to a plasma treatment process.

53. (Currently Amended) The method of claim 51, wherein the ~~processing gas further comprises a dopant is~~ selected from the group consisting of ~~a boron-containing compound, a phosphorus-containing compound,~~ phosphine (PH_3), borane (BH_3), diborane (B_2H_6), silazane compounds, ~~oxygen (O_2), ozone (O_3), carbon monoxide (CO), carbon dioxide (CO_2),~~ and combinations thereof.

54. (Previously Presented) The method of claim 51, wherein the silicon carbide layer has a dielectric constant of less than 4.

55. (Previously Presented) The method of claim 51, wherein the silicon carbide layer is deposited in a damascene structure as a material layer selected from the group consisting of a silicon carbide-containing barrier layer and a silicon carbide-containing etch stop layer.

56. (Previously Presented) The method of claim 51, further comprising depositing a dielectric layer adjacent the silicon carbide layer.

Please add new claims 57-61 as follows:

57. (New) A method for depositing a silicon carbide layer on a substrate, comprising:
introducing a processing gas comprising an organosilicon compound into a processing chamber containing the substrate therein, wherein the organosilicon compound has the formula $\text{SiH}_a(\text{CH}_3)_b(\text{C}_6\text{H}_5)_c$, wherein c is 1 and $a+b+c=4$; and
reacting the organosilicon compound to deposit the silicon carbide layer on the substrate.

58. (New) The method of claim 57, wherein the processing gas further comprises a dopant selected from the group consisting of an oxygen-containing compound, a nitrogen-containing compound, a boron-containing compound, a phosphorus-containing compound, organosiloxane compounds, 1,3,5,7-tetramethylcyclotetrasiloxane (TMCTS), octamethylcyclotetrasiloxane (OMCTS), 1,1,3,3-tetramethyldisiloxane (TMDSO),

phosphine (PH₃), borane (BH₃), diborane (B₂H₆), silazane compounds, trimethylsilane, oxygen (O₂), ozone (O₃), carbon monoxide (CO), carbon dioxide (CO₂), ammonia (NH₃), nitrogen (N₂), and combinations thereof.

59. (New) The method of claim 57, wherein the organosilicon compound comprises dimethylphenylsilane (SiH₁(CH₃)₂(C₆H₅)₁).

60. (New) The method of claim 57, wherein the silicon carbide layer is deposited in a damascene structure as a material layer selected from the group consisting of a silicon carbide-containing barrier layer and a silicon carbide-containing etch stop layer.

61. (New) The method of claim 57, wherein the silicon carbide layer has a dielectric constant of less than 4.